

METRIC

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SUPERSEDING
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MILITARY SPECIFICATION

PIN, GROOVED, HEADLESS-LONGITUDINAL GROOVE, METRIC, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers metric headless-grooved pins having longitudinal grooves.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- QQ-P-416 - Plating, Cadmium (Electrodeposited)
- QQ-Z-325 - Zinc Coating, Electrodeposited, Requirements for
- PPP-H-1581 - Hardware (Fasteners and Related Items), Packaging of

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Command, ATTN:DRDAR-TST-S, Dover, NJ 07801 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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MIL-I-17214 - Indicator, Permeability; Low-Mu (Go-No-Go)

(See supplement 1 for list of associated specification sheets.)

STANDARDS

FEDERAL

FED-STD-66 - Steel: Chemical Composition and Hardenability

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DODISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ANSI/ASTM A380 - Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references other than specification sheets cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

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3.2 Material. Recycled and reclaimed materials (see 3.1) shall be used to the maximum extent practicable.

3.2.1 Carbon steel. Carbon steel grooved pins shall be cold drawn low carbon steel wire or cold finished bar. The steel shall conform to one of the 1100 or 1200 series of FED-STD-66.

3.2.2 Corrosion resistant steel. Corrosion-resistant steel grooved pins shall be cold drawn CRES wire or cold finished bar. The steel shall conform to one of the 300 series steel of FED-STD-66, and shall meet the magnetic permeability requirement of 3.4.1.

3.3 Dimensions. Dimensions and tolerances for all types of pins shall conform to the dimensional requirements of the applicable specification sheet and shall apply after protective finishes (see 4.6.1).

3.3.1 Grooves. Grooved pins shall have three (3) grooves equally spaced on the diameter. All grooves in any pin shall be uniform depth, shape and length and the crests shall be free from tears, burrs or other irregularities over the entire length of groove. Grooves shall be aligned with axis of pin and unless otherwise specified, shall be parallel or tapered and of length as designated for the respective pin types.

3.4 Performance characteristics. The pins shall meet the following performance requirements when subjected to the applicable test specified in 4.8.

3.4.1 Magnetic permeability. Magnetic permeability of the CRES grooved pins shall not be greater than 2.0 (air = 1.257 $\mu\text{H/m}$) (microhenry per meter) at a field of 16 KA/m (Kiloampere per meter) (see 4.6.2).

3.4.2 Double shear force. Pins shall be capable of withstanding the minimum double shear force specified in table I (see 4.6.3).

TABLE I. Double shear force.

Nom pin dia(mm)	Double shear force (Kilonewtons) min	
	Carbon steel	CRES
1.5	1.6	2.2
2	2.8	3.9
2.5	4.4	6.1
3	6.3	8.8
4	11.2	15.6
5	17.6	24.3
6	25.3	35.1
8	45.0	62.3
10	70.4	97.4
12	101.3	140.3

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3.5 Finish. The protective finish of the grooved pins when specified in the applicable specification sheet shall be as follows (see 4.6.4).

3.5.1 Cadmium plate. Carbon steel pins shall be cadmium plated in accordance with QQ-P-416, type I, class 3 (5.1 μm thick).

3.5.2 Zinc coating. Carbon steel pins shall be zinc coated in accordance with QQ-Z-325, type I, class 3 (5.1 μm thick).

3.5.3 Cleaning and descaling. Corrosion-resistant steel pins shall be cleaned and descaled in accordance with ASTM A380.

3.6 Workmanship. The workmanship shall be uniform in quality and free of irregularities or detrimental defects. The surfaces shall not contain any foreign matter.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Materials inspection (see 4.3)
- b. Quality conformance inspection (see 4.5)

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials used in fabricating the pins are in accordance with the requirements of 3.2 prior to such fabrication.

4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.6.1 thru 4.6.4.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and C inspections.

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4.5.1.1 Inspection lot. An inspection lot shall consist of all pins covered by a single specification sheet, produced under essentially the same conditions, and offered for inspection at any one time.

4.5.1.2 Group A inspection. Group A inspection shall consist of the inspection specified in table II. The Acceptable Quality Level (AQL) shall apply to each individual defect, not to a group of defects.

4.5.1.2.1 Sampling plan. Statistical sampling and inspection for subgroup 1 shall be in accordance with MIL-STD-105 for general inspection level II. Major and minor defects shall be as defined in table III. Sampling and inspection for subgroup 2 shall be in accordance with MIL-STD-105 for special inspection level S-4.

4.5.1.2.1.1 Rejected lots (subgroup 1). Rejected inspection lots may be resubmitted for Government acceptance only if the manufacturer performs 100 percent inspection on the pins of the lot for those characteristics which were defective and resulted in rejection of the lot and removes all defective units and resubmits the lot for quality conformance inspection. Resubmitted lots shall be kept separate from new lots and shall be clearly identified as resubmitted lots. Resubmitted lots shall be inspected using the tightened inspection procedure of MIL-STD-105 and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed.

4.5.1.2.1.2 Rejected lots (subgroup 2). If an inspection lot is rejected, the manufacturer may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection procedure of MIL-STD-105 and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

Table II. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Sampling procedure	
			Major	Minor
<u>Subgroup 1</u>			AQL (Percent defective)	
Dimensions	3.3	4.6.1	2.5	4.0
Grooves	3.3.1	4.6.1	2.5	-
Finish	3.5	4.6.4	-	4.0
<u>Subgroup 2</u>			AQL (Percent defective)	
Magnetic permeability	3.4.1	4.6.2	2.5	

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4.5.1.2.2 Depositions of sample units. Sample units which have passed all the group A inspections may be delivered on the contract or purchase order.

Table III. Classification of defects.

Category	Defect	Inspection method
Critical	None defined	
Major	AQL = 2.5 percent defective	
101	Expanded diameter of pin	Gage
102	Nominal diameter of pin	SIE ^{1/}
103	Grooves missing or wrong type of grooves	Visual
Minor	AQL = 4.0 percent defective	
201	Crown height of pin	SIE ^{1/}
202	Length of pin	SIE ^{1/}
203	Protective finish missing (see 4.6.4 for test)	Visual
204	Workmanship	Visual

^{1/} Standard inspection equipment

4.5.1.3 Group C inspection. Group C inspection shall consist of the tests specified in Table IV in the order shown. They shall be performed on sample units that have been subjected to and have passed the group A inspection.

Table IV. Group C inspection.

Inspection	Requirement paragraph	Test method paragraph	AQL (percent defective)
Shear force	3.4.2	4.6.3	1.5

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4.5.1.3.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105. Unless otherwise specified herein, S-2 inspection shall be used.

4.5.1.3.2 Defectives. If the number of defects exceed the number allowed in table IV, the sample shall be considered to have failed.

4.5.1.3.3 Deposition of samples. Sample units which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

4.5.1.3.4 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which are manufactured under essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After the corrective action has been taken group C inspection shall be repeated on additional sample units (all tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Group A inspection may be reinstated; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.2 Inspection of packaging. The sampling and inspection of the preservation-packaging, packing and container marking shall be in accordance with the requirements of PPP-H-1581.

4.6 Method of inspection.

4.6.1 Visual, dimensional and groove examination. Each grooved pin taken as specified in 4.5.1.2 shall be examined to verify conformance with this specification. Examination shall be conducted in accordance with table II.

4.6.2 Magnetic permeability test. When specified (see 6.2), corrosion-resistant steel pins taken in accordance with 4.5.1.2.1 shall be tested for compliance to the magnetic permeability requirements of 3.4.1. The test indicator shall be in accordance with MIL-I-17214.

4.6.3 Shear force test. Each grooved pin taken as specified in 4.5.1.3 shall be tested for shear force in accordance with 4.6.3.2.

4.6.3.1 Shear test fixture. The shear test shall be made by means of a suitable fixture which meets the following requirements. The shear plane shall be at least one pin diameter away from the end of the pin. Clearance between the loading and supporting members shall be 0.127 mm maximum. Hardness of the loading and supporting members shall be 55HRC minimum. The hole for the pins shall have sharp edges and shall be as specified in the applicable specification sheet.

4.6.3.2 Shear test method. Grooved pins shall be tested by the double shear method and shall withstand the minimum force as shown in table I.

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4.6.4 Finish test. The carbon steel pins shall conform to QQ-P-416 or QQ-Z-325. Corrosion-resistant steel pins shall conform to the finish test of ASTM A380.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with PPP-H-1581 (see 6.2).

6. NOTES

6.1 Intended use. Grooved pins are intended for use in such application where ordinary straight and tapered pins might be used with press fit, but where use of grooved pins afford greater economy or strength.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification and applicable specification sheet.
- b. Applicable military specification number(s).
- c. Level (degree) of protection in accordance with PPP-H-1581, ordering data (see 5.1).
- d. Magnetic permeability test of CRES pins when required (see 4.6.2).

6.3 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - AR
Navy - OS
Air Force - 99

Preparing activity:

Army - AR

(Project 5315-0355)

Review activities:

Army - AT, EA
DLA - IS
NSA - NS

User activities:

Army - ME, MI
Navy - MC, YD

Agent:

DLA - IS

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PIN, GROOVED, HEADLESS-LONGITUDINAL GROOVE, METRIC, GENERAL SPECIFICATION FOR	
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